

Claims

1. A perpendicular magnetic recording medium comprising a substrate, a soft magnetic underlayer, a seedlayer directly on the soft magnetic underlayer, a RuCr_x -containing interlayer having $15 \leq x \leq 50$ on the seedlayer and a magnetic recording layer in this order.
2. The medium of claim 1, wherein the magnetic recording layer is a SiO_2 -containing magnetic layer.
3. The medium of claim 1, wherein the medium is a granular medium.
4. The medium of claim 1, wherein the seedlayer is less than 3 nm thick and comprises a face-centered cubic structure.
5. The medium of claim 1, wherein the RuCr_x -containing interlayer is directly on the seedlayer.
6. The medium of claim 1, wherein magnetic recording layer comprises Pt and Co, and other combinations of B, Cr, Co, Pt, Ni, Ta, Nb, Al, Si, Zr, Hf, W, C, Mo, Ru, O and N.
7. The medium of claim 1, wherein the soft underlayer has laminated structure with spacer layer(s) between the laminations of the soft underlayers.

8. The medium of claim 1, wherein the soft underlayer is substantially amorphous or nanocrystalline.
9. The medium of claim 1, wherein the interlayer comprises a dual interlayer structure with the 1st and the 2nd RuCr_x-containing interlayers both having $15 \leq x \leq 50$ and having hexagonal close-packed structure, and the 2nd interlayer comprises a structure with separated column grains.
10. The medium of claim 9, wherein the 1st RuCr_x-containing interlayer is directly deposited on the seed layer, and the 2nd RuCr_x-containing interlayer is directly under the magnetic recording layer.
11. A method of manufacturing a perpendicular recording medium comprising obtaining a substrate, depositing a soft magnetic underlayer, depositing a seedlayer directly on the soft magnetic underlayer, depositing a 1st RuCr_x-containing interlayer under a first gas pressure and depositing a 2nd RuCr_x-containing interlayer under a second gas pressure, the 1st and 2nd RuCr_x-containing interlayers having $15 \leq x \leq 50$ on the seedlayer and the first gas pressure being lower than the second gas pressure.
12. The method of claim 11, further comprising depositing a magnetic recording layer comprising Pt and Co, and other combinations of B, Cr, Co, Pt, Ni, Ta, Nb, Al, Si, Zr, Hf, W, C, Mo, Ru, O and N.

13. The method of claim 12, wherein the magnetic recording layer contains about 1 to 12 mol. % SiO_2 .

14. The method of claim 11, wherein the 1st RuCr_x -containing interlayer has substantially no epitaxial relationship with the seedlayer.

15. The method of claim 11, wherein the seedlayer comprises a material selected from the group consisting of Cu, Ag, Au, Pt, Pd and combinations thereof.

16. The method of claim 11, wherein the 1st RuCr_x -containing interlayer is directly on the seedlayer.

17. The method of claim 12, wherein magnetic recording layer comprises CoCrPt-SiO_2 .

18. The method of claim 11, wherein the soft underlayer has laminated structure with spacer layer(s) between the laminations of soft underlayers.

19. The method of claim 18, wherein the order of layers on the substrate, the laminated soft underlayer with spacer layer(s) between the laminations of the soft underlayers, the seedlayer, the 1st RuCr_x -containing interlayer, the 2nd RuCr_x -containing

interlayer and a magnetic recording layer, wherein the magnetic recording layer is a oxides or nitrides-containing magnetic layer.

20 The method of claim 19, wherein the 1st and 2nd RuCr_x-containing interlayers have $25 \leq x \leq 50$.